

WHAT IS CLAIMED IS:

1. An image reproduction apparatus, comprising:

storage means for storing a plurality of partial  
images obtained by dividing an entire image by a  
predetermined field of view for each of a plurality of  
entire images corresponding to a plurality of view  
points, the entire image having a field of view wider  
than a display field of view of an image displayed on  
display means;

selection means for selecting any of the partial  
images stored in said storage means based on  
information about a position and a direction of a  
viewpoint, and the display field of view of the image  
displayed on the display means; and

generation means for generating an image  
corresponding to the position and the direction of a  
viewpoint from the selected partial image, and  
providing the generated image for the display means.

2. The apparatus according to claim 1, wherein, each  
of the entire images is panoramic image, and

when a plurality of partial images are selected by  
said selection means, said generation means generates  
the image to be displayed on said display means by

extracting an image corresponding to the position and  
the direction of a viewpoint from an image obtained by  
combining the partial images.

3. The apparatus according to claim 1, wherein  
said storage means stores partial images obtained  
by dividing an entire image such that adjacent partial  
5 images share overlapping portions.

4. The apparatus according to claim 3, wherein  
a field of view of the partial image doubles the  
display field of view, and the whole of the partial  
10 image is overlapped by adjacent partial images thereof.

5. The apparatus according to claim 1, wherein  
said storage means stores each partial image in an  
independent file.  
15

6. The apparatus according to claim 5, wherein:  
said position of a viewpoint moves along a road on  
a map; and  
said apparatus further comprises read means for  
20 determining a file next required based on the road  
containing the position of the viewpoint and the moving  
direction before the viewpoint position information is  
input.

25 7. The apparatus according to claim 1, wherein:  
said storage means stores  $m \times n$  partial images  
obtained by  $n$  entire images each comprising  $m$  partial

AI  
OK

images, and header information indicating a start position of each of the  $m \times n$  partial images in one file; and

5 said selection means determines a file containing an entire image corresponding to the viewpoint position information, determines a partial image to be used by said generation means based on the viewpoint direction information and the display field of view, and obtains a partial image to be provided according to the header  
10 information.

8. The apparatus according to claim 7, wherein said position of a viewpoint moves along a road on a map; and

15 said apparatus further comprises read means for determining a file next required based on the road containing the position of the viewpoint and the moving direction before the viewpoint position information is input.

20

9. The apparatus according to claim 1, wherein said storage means compresses and stores each partial image.

sub  
du

25 10. The apparatus according to claim 1, wherein said storage means stores each partial image as a 90° rotated image.

11. An image reproducing method, comprising the steps of:

storing in storage means a panoramic image as  
5 partial images obtained by dividing an entire image by  
a predetermined field of view for each of a plurality  
of entire images corresponding to a plurality of view  
points, the entire image having a field of view wider  
than a display field of view of an image displayed on  
10 display means;

selecting any of the partial images stored in said  
storage means based on information about a position and  
a direction of a viewpoint, and the display field of  
view of the image displayed on the display means; and

15 generating an image corresponding to the position  
and the direction of a viewpoint from the selected  
partial image, and providing the generated image for  
the display means.

20 12. The method according to claim 11, wherein, each of  
the entire images is a panoramic image, and

when a plurality of partial images are selected in  
said selecting step, said generating step extracts an  
image corresponding to the position and the direction  
25 of a viewpoint from an image obtained by combining the  
partial images.

13. The method according to claim 11, wherein  
said storing step stores partial images obtained  
by dividing an entire image such that adjacent partial  
images share overlapping portions.

5

14. The method according to claim 13, wherein  
a field of view of the partial image doubles the  
display field of view, and adjacent partial images  
necessarily have overlapping portions.

10

15. The method according to claim 11, wherein  
said storing step stores each partial image in an  
independent file.

15

16. The method according to claim 15, wherein:  
said position of a viewpoint moves along a road on  
a map; and

20

said apparatus further comprises a reading step of  
determining a file next required based on the road  
containing the position of the viewpoint and the moving  
direction before the viewpoint position information is  
input.

25

17. The apparatus according to claim 11, wherein:  
said storing step stores  $m \times n$  partial images  
obtained by  $n$  entire images each comprising  $m$  partial  
images, and header information indicating a start

position of each of the m x n partial images in one file; and

AI  
cont

5 said selecting step determines a file containing an entire image corresponding to the viewpoint position information, determines a partial image to be used in said generating step based on the viewpoint direction information and the display field of view, and obtains a partial image to be provided according to the header information.

10

18. The method according to claim 17, wherein said position of a viewpoint moves along a road on a map; and

15 said apparatus further comprises a read step of determining a file next required based on the road containing the position of the viewpoint and the moving direction before the viewpoint position information is input.

20 19. The method according to claim 11, wherein said storing step compresses and stores each partial image.

Sub  
AI

25 20. The method according to claim 11, wherein said storing step stores each partial image as a 90° rotated image.

21. An image processing apparatus, comprising:  
division means for dividing an image having a  
predetermined field of view into a plurality of partial  
images;

5 compression means for compressing each of the  
partial images divided by said division means;

storage means for adding position information to  
each of the partial images compressed by said  
compression means and storing the image;

10 input means for inputting position information;  
and

decoding means for reading a corresponding partial  
image from said storage means according to the input  
information input by said input means, and decoding the  
15 image.

22. The apparatus according to claim 21, wherein  
said division means is designed to divide a  
panoramic image into a plurality of field of view.

20

23. The apparatus according to claim 22, wherein:

said input means inputs the position information  
and field of view information, and said decoding means  
compares the position information and the field of view  
25 information with position information stored in said  
storage means, thereby reading and decoding partial  
images corresponding to the position and the field of

view input by said input means.

24. The apparatus according to claim 23, further comprising

5 image combining means for combining a plurality of images when there are a plurality of images decoded by said decoding means.

25. The apparatus according to claim 24, wherein  
10 a plurality of partial image stored in said storage means share overlapping portions with each other.

26. The apparatus according to claim 21, wherein  
15 said position information about partial images stored in said storage means is linked to the position information on a map, and said input means can input the position and the viewpoint direction on the map.

20 27. An image processing method, comprising the steps of:

dividing an image having a predetermined field of view into a plurality of partial images;

compressing each of the partial images divided in  
25 said dividing step;

adding position information to each of partial images compressed in said compressing step, and storing



the image;

inputting position information; and

reading a corresponding partial image from said storage means according to the input information input

5 by said inputting step, and decoding the image.

28. The method according to claim 27, wherein

said diving step is designed to divide a panoramic image into a plurality of field of view.

10

29. The method according to claim 28, wherein:

said inputting step inputs the position information and field of view information, and said decoding step compares the position information and the field of view information with position information stored in said storing step, thereby reading and decoding partial images corresponding to the position and the field of view input in said inputting step.

15

20 30. The method according to claim 29, further comprising

image combining step of combining a plurality of images when there are a plurality of images decoded in said decoding step.

25

31. The method according to claim 30, wherein

a plurality of partial image stored in said

storing step share overlapping portions with each other.

32. The method according to claim 27, wherein  
said position information about partial images  
5 stored in said storing step is linked to the position  
information on a map, and said inputting step can input  
the position and the viewpoint direction on the map.

33. A computer-executable program, comprising:  
10 a code of storing in storage means a plurality of  
partial images obtained by dividing an entire image by  
a predetermined field of view for each of a plurality  
of entire images corresponding to a plurality of view  
points, the entire image having a field of view wider  
15 than a display field of view of an image displayed on  
display means;

a code of selecting any of the partial images  
stored in said storage means based on information about  
a position and a direction of a viewpoint, and the  
20 display field of view of the image displayed on the  
display means; and

a code of generating an image corresponding to the  
position and the direction of a viewpoint from the  
selected partial image, and providing the generated  
25 image for the display means.

34. A computer-executable program, comprising:

a code of dividing an image having a predetermined field of view into a plurality of partial images;

a code of compressing each of the partial images divided in said dividing step;

5 a code of adding position information to each of partial images compressed in said compressing step, and storing the image;

a code of inputting position information; and

10 a code of reading a corresponding partial image from said storage means according to the input information input by said inputting step, and decoding the image.

35. A storage medium storing a computer-executable control program, said control program comprising:

15 a code of storing in storage means a plurality of partial images obtained by dividing an entire image by a predetermined field of view for each of a plurality of entire images corresponding to a plurality of view points, the entire image having a field of view wider than a display field of view of an image displayed on display means;

20 a code of selecting any of the partial images stored in said storage means based on information about a position and a direction of a viewpoint, and the display field of view of the image displayed on the display means; and

21  
21.1

a code of generating an image corresponding to the position and the direction of a viewpoint from the selected partial image, and providing the generated image for the display means.

5

36. A storage medium storing a computer-executable control program, said control program comprising:

a code of dividing an image having a predetermined field of view into a plurality of partial images;

10 a code of compressing each of the partial images divided in said dividing step;

a code of adding position information to each of partial images compressed in said compressing step, and storing the image;

15 a code of inputting position information; and

a code of reading a corresponding partial image from said storage means according to the input information input by said inputting step, and decoding the image.

20

20.1  
21.1